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veins on the outer part of the wings. Hind wings transparent, fringes fuscous, narrowly orange at base. Underside of fore wings golden-orange with the veins on outer part violet. Hind wings beneath same as above. Antennæ black. Expanse, 22 mm.

1 ♀, Summit of Mt. Union, 9,000 feet, Arizona, July 3, 1887, flying about scrub oak (G. D. Hulst). Coll. Hy. Edwards.

1 ♀, Texas. Coll. U. S. Nat. Mus.

***Pyrrotænia coccinea*, sp. nov.**

Head black; palpi yellow, tip black; collar narrowly edged with white in front. Thorax and abdomen bronzy-black with a metallic reflection. Antennæ brown-black. Underside of thorax with a scarlet patch on each side. Legs metallic blue-black. Fore wings bright scarlet-red, outer border and a round spot at end of cell bronzy-brown. Hind wings brown. Underside of fore wings light orange, outer part brown, discal spot much reduced. Hind wings beneath same as above. Expanse, 12 mm.

1 ♀, Albuquerque, New Mexico. (Cockerell.) Type, Coll. U. S. Nat. Mus.

Very different from any of the hitherto known species. It may be at once recognized by the bright red fore wings with brown outer border and discal spot.

THE LIFE-HISTORIES OF THE NEW YORK SLUG CATERPILLARS.—XVII.

PLATE XI, FIGS. 1-12.

BY HARRISON G. DYAR, A.M., PH.D.

***Heterogenea shurtleffii* Packard.**

1864—*Heterogenea shurtleffii* PACKARD, Proc. Ent. Soc. Phil. III, 346.

1882—*Heterogenea shurtleffii* GROTE, Check List. p. 18.

1891—*Heterogenea shurtleffii* and var. *casonia* SMITH, List Lep. p. 29.

1892—*Heterogenea shurtleffii* KIRBY, Cat. Lep. Het. I, 556.

1894—*Heterogenea casonia* ? NEUMÆGEN & DYAR, J. N. Y. Ent. Soc. II, 74.

SPECIAL STRUCTURAL CHARACTERS.

Dorsal space rather narrow and of uniform width, narrowing a little posteriorly, but scarcely so anteriorly; full, rounded, not concave. Sides obliquely concave; subventral space small, retracted. Ridges at first prominent, with large, low, distinct segmentary tubercles; later the subdorsal ridge indicated by the change in direction between

back and sides, lateral one projecting, smooth, neither ever spinose. Setæ of stage I, as in *Tortricidia pallida*, differing only in detail. Later the warts are represented by distinct short setæ which diminish nearly to obliteration during ontogeny. Depressed spaces well developed, fairly large, (1) to (8) present. Skin at first smooth, later covered with round, clear granules, each with a minute central spine and crown of four to eight around it, causing the skin to appear minutely furry. The granules appear well formed first on the ridges, later spreading more evenly over the body. The fur-like spines become smaller at each subsequent molt till in the last stage they are absent, leaving the granules perfectly smooth. Coloration green with yellow lines and a small red mark. There are six larval stages.

AFFINITIES, HABITS, ETC.*

Allied to *Tortricidia pallida* and *Heterogenea flexuosa*. Stage I is most like *flexuosa*, but the Y-shaped setæ are distinctly alternating, as in *pallida*, or more so, and there is a brown cervical shield. In stage II the setæ persist as in *pallida*, but the granulation is at once distinguished from either by the peculiar fur on the ridges, which passes less perfectly into the spaces. The ridges are prominent and distinctly segmentarily beaded as in neither of the allies. Later, owing to the diminution of the fur and the small size of the red mark, the larva resembles most *flexuosa*, and may be distinguished from some forms of that species only by the yellow collar. It is less strongly pigmented, a clearer, less yellowish-green, while the pattern of coloration is much less extended, though essentially the same as in both allies. The transverse yellow line on joint 3, or collar, is present in this species only. The depressed spaces are yellow, as in *flexuosa*.

The moths emerge somewhat later than those of the allied species, during the first weeks in July. The larvæ have the same habits and occur in the same situations as *flexuosa*, but show a more marked pref-

* The nearest ally of our *H. shurtleffii* will doubtless prove to be the European *H. cruciata*. The moths are strictly congeneric, whereas *H. flexuosa* and its variety *casonia* do not belong to *Heterogenea* or to *Lithacodes*, but properly to *Tortricidia*. *H. shurtleffii* has been very rare in collections, only the type being known for thirty-four years. Consequently it appeared to Mr. Neumøgen and myself that it might prove an aberrant form of *casonia*. However we overlooked two important structural characters, not having the type for examination; but this has recently been sent to me by Mr. Henshaw. It agrees with my bred specimens, of which a full account is presented herewith. The specimens are deposited in the U. S. National Museum.

erence for large trees. I have found them rarely in Van Courtlandt Park, New York, and in several places on Long Island, most numerous at South-haven and Speonk. Mr. Joutel has found them at Glendale, but on small trees, as he tells me. This species is distinctly a local one, and when once found, a number of larvæ can be secured. I have encountered a colony in the District of Columbia on some iron wood trees growing on the shores of Rock Creek and overhanging the water. The situation is such that any other of our Eucleids could not live there, as they would fall in the water and be drowned at pupating time.

The larval stages are passed with unusual rapidity. Mature larvæ are first seen early in August, and but few last into September. With the exception of *Kronæa minuta*, this is our smallest Eucleid larva.

CRITICISM OF PREVIOUS DESCRIPTIONS.

This larva has not been described, yet a specimen was seen by us before writing the synoptic table (Journ. N. Y. Ent. Soc., III, 146), and confused there with *Heterogenea flexuosa*.* Only the last five words of the diagnosis were written actually from a specimen of *flexuosa*; the other words apply to the species, although not indicating the best specific differences. A corrected synoptic table will be given at the end of these articles.

DESCRIPTION OF THE SEVERAL STAGES IN DETAIL.

Egg.—Very small; elliptical, flat, shining, slightly milky and iridescent. Reticulations obscure, linear, elongated and irregularly quadrangular, not peculiar; size .8 x .5 mm., rarely 1.0 x .6 mm.

Stage I.—Highest in front at first, later higher in the middle and more rounded, truncate before, tail rounded. Spines as in *T. pallida*, but smaller, distinctly alternating, the Y-shaped spines of joints 5, 7, 9 and 11 leaning out sometimes so much so that those of joints 7 and 9 lean at 90° and those of joints 5 and 11 at 45° with the erect ones on the strong segments. The anterior limb of the Y-spines has a tendency to be shorter, especially on the weak segments, where, as on joint 11, it may be scarcely more than half as long as the other and lack the cleft tip. Tips bifid or trifid, brown, narrowed just before

* In the long series of bred *flexuosa-cæsonia* from the collection of the late Mr. S. L. Elliot, occurs a single specimen of *shurtleffii*, showing that he, too, had confused the larvæ.

the apex, the shaft of the spine pale. Color whitish, no marks except a large brown cervical shield. Head pale, eye black, mouth brown. Skin smooth as usual. Length .8–1.2 mm. Duration of the stage seven days.

Stage II.—Elongate elliptical, joint 3 truncate before, tail broadly square, scarcely notched at the sides. Dorsum and sides moderate, not distinctly concave, nearly flat. Subdorsal ridge segmentarily tubercular with large, low, round tubercles, bearing two short, black setæ, alternating, the tubercles of joints 5, 7 and 9 a little tipped outward. Lateral ridge not tubercular, gently waved segmentarily. Both ridges broadly covered with nearly contiguous granules, produced with pale slender spines, several from a granule; on the apices of the tubercles and edge of the lateral ridge these spines are usually dark and distinctly seen, under a high power, to be arranged in the form of a radiating crown of 4 to 6 around an erect central spine (Plate XI, Fig. 5). Dorsal and lateral spaces centrally nearly smooth, the granules feebly developed. Depressed spaces indicated, slightly sunken, not fully differentiated and protected between the setose ridges. Color whitish, faintly tinged with green; dorsum darker from the food showing by transparency. Length, 1.2–1.9 mm.

Stage III.—Elliptical, not much elongated, tail rounded, quadrate, distinctly notched at the sides. Dorsum slightly, lateral space distinctly concave, subventral space very small and retracted. Subdorsal ridge prominent, segmentarily beaded tubercular. Both ridges with short, distinct black primary setæ. Depressed spaces rather large and distinct, especially (1) and (4), the other small ones visible in a good light, none very sharply edged. Skin granules large on the tubercles, bearing a crown of minute black spines, losing these and grading off into smaller granules on the latticed ridges. The paler spines on these ridges may be seen in favorable lights to overhang the edges of the depressed spaces like minute fur. Lateral ridge weakly segmentarily waved with single setæ at the projections. The latticed ridges are broad, several granules wide, the depressed spaces finely granular in the bottom. Color frosted whitish, opaque, no marks; later all faintly bluish-green from the blood, still without marks; still later a narrow yellow subdorsal line appears in a series of dots on joints 4 to 10, free, or connected by a short bar on joint 8, either yellow or pinkish red. The brown rosette spines on the ridge give a shade along all the ridges and joining at the ends. Length, 1.8–2.8 mm.

Stage IV.—Elliptical, tail rounded quadrate, in general as *T. pallida*; ridges, especially the sub-dorsal, slightly segmentarily waved. Depressed spaces deep, well marked with perpendicular sides. Skin on the latticed ridges shortly, finely, densely white pubescent with minute colorless fur arising in a crown from each small granule. On the ridges the fur is usually dark, but it may be pale and concolorous with the rest. Granules nearly uniform on all the latticed ridges, which are at least four granules wide. Depressed spaces (1) to (8) present, (7) and (8) partly confluent obliquely. Color light yellowish-green, sparsely pigmented in patches dorsally and in the upper half of lateral space, the ridges clearer. A narrow wavy yellow sub-dorsal line on joints 4 to 13, often appearing double at a certain angle by the refraction of the distinct clear ridge, the pair connected by a narrow crimson bridge on joint 8, varying in different examples. A faint yellow or salmon colored transverse band on the anterior edge of joint 3, shaded dusky by the dark rosette spines. Sides paler green, depressed spaces darker, without colored centers. Head green, width about .5 mm. Length, 2.6–4.0 mm.

Stage V.—Elliptical, tail rounded, slightly notched at the sides; dorsal space about half as broad as the lateral one, flat; lateral space steep above, slightly concave; subventral small, retracted; the larva is therefore flattened. Subdorsal ridge indicated by the angular change in direction between back and sides; lateral ridge prominent. Depressed spaces fairly large, distinct. Latticed ridges rounded, the sides not always perpendicular. The skin looks smooth, minutely granular, even shining a little; but under a high power the 4 to 6 rosette spines are still seen on the granules, very short and pale. The granules are small, rounded, not quite contiguous, uniform all over, the narrowest latticed ridge four granules wide. The rosette spines are dusky on the anterior edge of joint 3. Color bright yellow green, rather translucent on the edges. The yellow subdorsal lines extend from joint 3 posteriorly to joint 13 anteriorly, narrowed at the addorsal depressed spaces, slender, not reaching the extremities. A yellow band on joint 3 anteriorly, shaded with crimson below. Depressed space (4) yellow in the base with a green center. Subdorsal lines free at the ends, a yellow bridge centrally, varying in different examples. It may become broad, covering joints 7–9, containing a round red spot on joints 7–8, scarcely even widening the subdorsal line. Length, 3.8–5.7 mm.

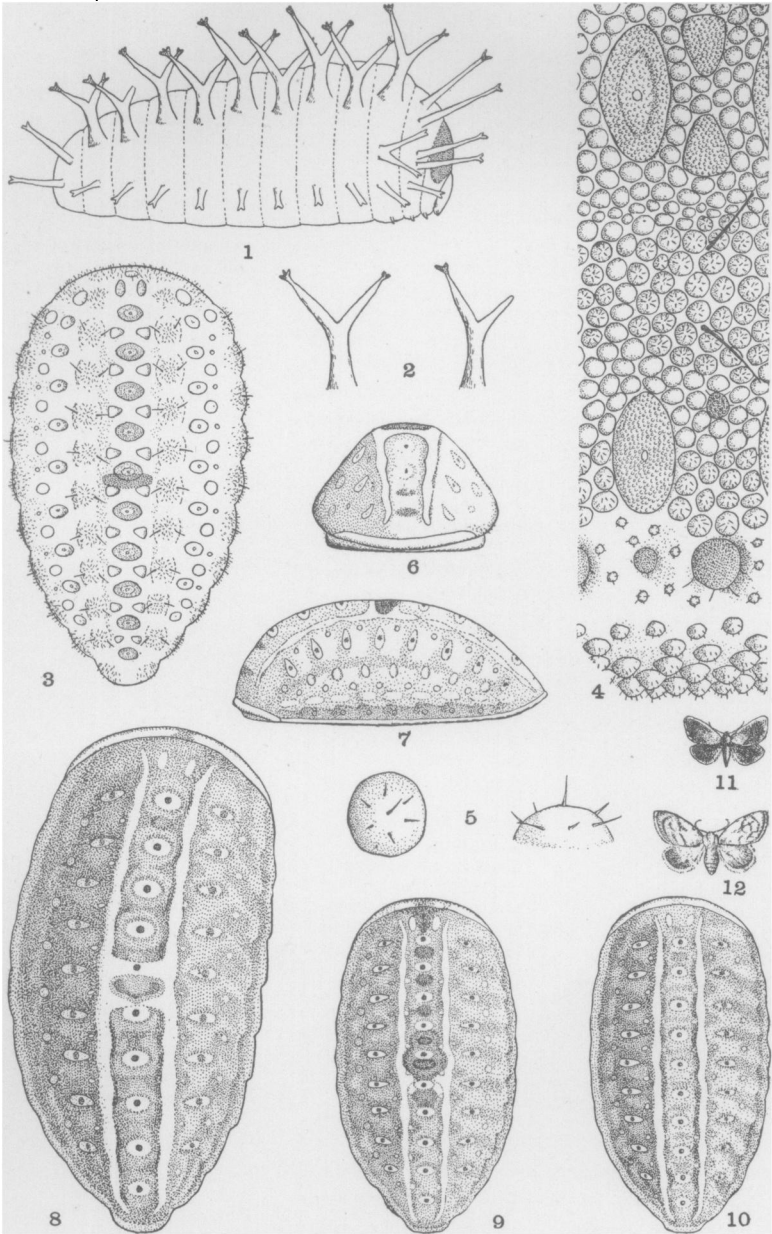
Stage VI.—Shape as described. Absolutely smooth, finely clear granular, the granules low, rounded, contiguous, but not appressed, without a trace of the rosette spines. Depressed spaces rather small, but sharp, the latticed ridges not less than five granules wide. Spaces very finely granular in the bottom; (1) flat before, with green glandular center, (2) rounded, highest in the center, (4) elongate. Pale yellowish-green, shading to nearly colorless on the lateral ridge, the dorsum and upper part of lateral area on joints 6 to 11 distinctly spotted with emerald green pigment. A narrow yellow sub-dorsal line, straight, but slightly crinkly edged, on joints 4 to 13, the pair free and uniform (Plate XI, Fig. 10), or partly or wholly connected by a yellow bridge, usually with a small red spot (Plate XI, Fig. 8), or rarely a rather large one covering joints 7 and 9 and widened on joint 8 (Plate XI, Fig. 9). The red spot varies in color from vermilion red to light blue or dark slaty blue, edged with crimson. On joint 3 in front, a transverse yellow line, edged with crimson below. A series of red spots usually appears, beginning on the collar in front and extending to joint 5, not discoloring the dorsal depressed spaces. The spots are dull and diffuse. At the end of the stage the pigment is all dissolved and the larva appears entirely transparent, dirty whitish or waxy greenish, the internal organs visible in motion. It eats for only a short time in this condition, and leaves the twig to spin. Length, 4.8–8.2 mm., in some large larvæ suddenly increased to 13.3 mm. at the end of the stage by the degenerative change in shape accompanying the loss of the pigment.

Cocoon as usual, elliptical, very small. The larvæ do not leave the tree, but spin in the crevices of the bark.

Food plants. Black oak, chestnut, beech, iron wood.

EXPLANATION OF PLATE XI.

- Fig. 1. Larva, stage I, side view enlarged.
“ 2. Two of the Y shaped setæ more enlarged.
“ 3. Young larva, stage III, dorsal view.
“ 4. A section of the skin granules, back and sides, stage III more enlarged.
“ 5. A single skin granule with rosette spines, top and side views.
“ 6. Mature larva, front view.
“ 7. The same side view.
“ 8. The same, dorsal view, the usual colorational form.
“ 9. The same, showing the largest red spot seen.
“ 10. The same, showing the absence of the red spot.
“ 11. Moth of *Heterogenea shurtleffii* ♂, suffused form.
“ 12. The same, ♀, normal form.



Life-History of *Heterogenea shurtleffii*.